

Name:	Kaustubh Vekhande
UID:	2023200128
Experiment No.	02

AIM:	Write a program to demonstrate constructor
Program 1	
PROBLEM STATEMENT :	<p>Design a Time class with data members hours, minutes and seconds. Add a no-argument constructor to the class which initializes hours, minutes, and seconds to 0. Further add two conversion() methods to the class. conversion1() method has the time in seconds as a parameter and converts and displays the time into hours, minutes and seconds, apart from initializing the time object. Write another method conversion2() which has 3 parameters, hours, minutes and seconds, which will compute and display the total seconds of a Time object. Write another class called TestTime which contains the main() method. Create 2 different objects of Time class in main(), first object should call conversion1() method user to enter seconds as an integer in the argument. And second object should call conversion2() with appropriate parameters. For example, if user enters 4205 seconds as an input called totSeconds, the answer should be:</p> <p>Hours : 1 Minutes : 10 Seconds : 5 Similarly, vice-versa. Use Scanner for reading data through keyboard</p>

PROGRAM:

```
class Time{
    int hours,minutes,seconds;
    Time(){
        hours=0;
        minutes=0;
        seconds=0;
    }

    void conversion1(int sec){
        hours = sec /3600;
        sec = sec%3600;
        minutes= sec/60;
        seconds= sec%60;
        System.out.println("Hours="+hours);
        System.out.println("Minutes=" + minutes);
        System.out.println("Seconds=" +seconds);
    }

    void conversion2(int hour, int min , int sec){
        hours =hour;
        minutes= min;
        seconds = sec;
        int totSec= hour*3600 +min*60+ sec;
        System.out.println("Total time in seconds =" +totSec);
    }
}

import java.util.*;

class TestTime{
    public static void main(String[] args) {
        Scanner sc= new Scanner(System.in);
        Time t1= new Time();
        System.out.println("Enter the total seconds: ");
        int totSec = sc.nextInt();
```

	<pre> t1.conversion1(totSec); Time t2= new Time(); System.out.println("Enter The hours "); int hour = sc.nextInt(); System.out.println("Enter The minutes "); int min = sc.nextInt(); System.out.println("Enter The seconds "); int sec = sc.nextInt(); t2.conversion2(hour, min, sec); sc.close(); } } </pre>
--	---

RESULT:

```

psipl@psipl-OptiPlex-3000:~/Desktop/2023200128/EXP 2$ java TestTime
Enter the total seconds:
45000
Hours=12
Minutes=30
Seconds=0
Enter The hours
34
Enter The minutes
56
Enter The seconds
2
Total time in seconds =125762
psipl@psipl-OptiPlex-3000:~/Desktop/2023200128/EXP 2$

```

Program 2

PROBLEM STATEMENT :

Create a class 'Employee' with three data members which are name, age and Salary. The constructor of the class assigns default values name as "unknown", age as '18' and salary as 20000. Write the setter and getter methods for class Employee. Write another method which prints the name, age and Salary of an employee. Test the methods in a separate

	class called TestEmployee which contains the main() method
PROGRAM:	<pre> class Employee{ String name; int age; int salary; Employee(){ this.name="unknown"; this.age= 18; this.salary = 20000; } void setName(String name){ this.name= name; } String getName(){ return name; } void setAge(int age){ this.age = age; } int getAge(){ return age; } void setSalary(int salary){ this.salary= salary; } int getSalary(){ return salary; } void printInfo(){ </pre>

```

        System.out.println("The Employee Details are: ");
        System.out.println("Employee name: "+name);
        System.out.println("Employee age: "+age+ " years");
        System.out.println("Salary: $" + salary);
    }
}

import java.util.*;

class TestEmployee{
    public static void main(String[] args) {
        Employee e1= new Employee();
        Scanner sc = new Scanner(System.in);

        //print the default details
        System.out.println("The default values are: ");
        e1.printInfo();

        System.out.print("Enter the name of Employee: ");
        String name = sc.nextLine();
        e1.setName(name);

        System.out.print("Enter the age of Employee: ");
        int age = sc.nextInt();
        e1.setAge(age);

        System.out.print("Enter the Salary of Employee:");
        int salary = sc.nextInt();
        e1.setSalary(salary);

        // Print the updated details
        System.out.println("\nUpdated details are:");
        e1.printInfo();

        sc.close();

    }
}

```

--	--

RESULT:

```
psipl@psipl-OptiPlex-3000:~/Desktop/2023200128/EXP 2$ javac TestEmployee.java
psipl@psipl-OptiPlex-3000:~/Desktop/2023200128/EXP 2$ java TestEmployee
The default values are:
The Employee Details are:
Employee name: unknown
Employee age: 18 years
Salary: $20000
Enter the name of Employee: kaustubh Vekhande
Enter the age of Employee: 20
Enter the Salary of Employee:20000

Updated details are:
The Employee Details are:
Employee name: kaustubh Vekhande
Employee age: 20 years
Salary: $20000
psipl@psipl-OptiPlex-3000:~/Desktop/2023200128/EXP 2$
```

Program 3

**PROBLEM
STATEMENT:**

3. Create a four-function calculator for fractions. Here are the formulas for the four arithmetic operations applied to fractions:
Addition: $a/b + c/d = (a*d + b*c) / (b*d)$
Subtraction: $a/b - c/d = (a*d - b*c) / (b*d)$
Multiplication: $a/b * c/d = (a*c) / (b*d)$
Division: $a/b / c/d = (a*d) / (b*c)$
Create the class fraction. Use default constructor to set numerator and denominator to 1.
a) There are methods to print the four functions for fractions.
b) Program generates a multiplication table for fractions. Let the user input a denominator, and then generate all combinations of two such fractions that are between 0 and 1, and multiply them together. Here's an example of the output if the denominator is 6:

	1/6	1/3	1/2	2/3	5/6
1/6	1/36	1/18	1/12	1/9	5/36
1/3	1/18	1/9	1/6	2/9	5/18
1/2	1/12	1/6	1/4	1/3	5/12
2/3	1/9	2/9	1/3	4/9	5/9
5/6	5/36	5/18	5/12	5/9	25/36

PROGRAM:

```
import java.util.Scanner;

class Fraction {
    int num;
    int den;

    Fraction() {
        num = 1;
        den = 1;
    }

    Fraction(int a, int b) {
        this.num = a;
        this.den = b;
    }

    int gcd(int a, int b) {
        if (b == 0)
            return a;
        else
            return gcd(b, a % b);
    }

    void reduce() {
```

```

        int divisor = gcd(num, den);
        num /= divisor;
        den /= divisor;
    }

    void print() {
        System.out.print("" + num + "/" + den);
    }

    void addFraction(Fraction f1, Fraction f2) {
        this.num = (f1.num * f2.den) + (f1.den * f2.num);
        this.den = (f1.den * f2.den);
        reduce();
        print();
    }

    void subFraction(Fraction f1, Fraction f2) {
        this.num = (f1.num * f2.den) - (f1.den * f2.num);
        this.den = (f1.den * f2.den);
        reduce();
        print();
    }

    void mulFraction(Fraction f1, Fraction f2) {
        this.num = (f1.num * f2.num);
        this.den = (f1.den * f2.den);
        reduce();
        print();
    }

    void divFraction(Fraction f1, Fraction f2) {
        this.num = (f1.num * f2.den);
        this.den = (f1.den * f2.num);
        reduce();
        if (this.den == 0) {
            System.out.println("Undefined!");
        } else {
            print();
        }
    }
}

```



```

void mulTable(int n) {
    int i;
    Fraction m = new Fraction();
    System.out.print("\n\t");
    for (i = 1; i <= n; i++) {
        Fraction f1 = new Fraction(i, n);
        f1.reduce();
        f1.print();
        System.out.print("\t");
    }
    System.out.println("\n");
    for (i = 1; i <= n; i++) {
        Fraction f1 = new Fraction(i, n);
        f1.reduce();
        f1.print();
        System.out.print("\t");
        for (int j = 1; j <= n; j++) {
            Fraction f2 = new Fraction(j, n);
            m.mulFaction(f1,f2);
            System.out.print("\t");
        }
        System.out.print("\n\n");
    }
}

```

```

public static void main(String[] args) {
    Fraction f = new Fraction();
    Scanner sc = new Scanner(System.in);
    int option;
    int a,b,c,d;

    System.out.print("Enter the numerator of 1st fraction: ");
    a = sc.nextInt();
    do{
        System.out.print("Enter the denominator of 1st fraction: ");
        b = sc.nextInt();
    }
}

```

```

        if (b == 0) { //
            System.out.println("Denominator of Fraction can't be zero.
Enter valid Denominator");
        }
        else
            break;

    }while(true);

    Fraction f1 = new Fraction(a, b);

    System.out.print("Enter the numerator of 2nd fraction: ");
    c = sc.nextInt();
    do{
        System.out.print("Enter the denominator of 2nd fraction: ");
        d = sc.nextInt();
        if (d == 0) { //
            System.out.println("Denominator of Fraction can't be zero.
Enter valid Denominator");
        }
        else
            break;

    }while(true);
    Fraction f2 = new Fraction(c, d);

    loop: while (true) {

System.out.println("\n\nMenu:\t1.Addition\t2.Subtraction\t3.Multiplication\t
4.Division\t5.Exit");
        System.out.print("Enter your choice: ");
        option = sc.nextInt();

        switch (option) {
            case 1:
                System.out.print("The resultant Addition of
Fractions is:");
                f.addFraction(f1, f2);
                break;

```

```

                                case 2:
                                    System.out.print("The resultant Subtraction
of Fractions is:");
                                    f.subFraction(f1, f2);
                                    break;

                                case 3:
                                    System.out.print("The resultant
Multiplication of Fractions is:");
                                    f.mulFaction(f1, f2);
                                    break;

                                case 4:
                                    System.out.print("The resultant Division of
Fractions is:");
                                    f.divFaction(f1, f2);
                                    break;

                                case 5:
                                    System.out.println("Exiting the calculator");
                                    break loop;

                                default:
                                    System.out.println("\nInvalid Option!");
                                    break;
                                }
                            }

                            System.out.print("Enter the denominator for multiplication table: ");
                            int z = sc.nextInt();
                            if (z <= 0) {
                                System.out.println("Invalid input! Please enter a positive integer.");
                            } else {
                                f.mulTable(z);
                            }
                            sc.close();
                        }
                    }
}

```

--	--

RESULT:

```

psipl@psipl-OptiPlex-3000:~/Desktop/2023200128/EXP 2$ javac Fraction.java
psipl@psipl-OptiPlex-3000:~/Desktop/2023200128/EXP 2$ java Fraction
Enter the numerator of 1st fraction: 45
Enter the denominator of 1st fraction: 31
Enter the numerator of 2nd fraction: 23
Enter the denominator of 2nd fraction: 43

Menu:  1.Addition      2.Subtraction    3.Multiplication    4.Division    5.Exit
Enter your choice: 1
The resultant Addition of Fractions is:2648/1333

Menu:  1.Addition      2.Subtraction    3.Multiplication    4.Division    5.Exit
Enter your choice: 2
The resultant Subtraction of Fractions is:1222/1333

Menu:  1.Addition      2.Subtraction    3.Multiplication    4.Division    5.Exit
Enter your choice: 3
The resultant Multiplication of Fractions is:1035/1333

Menu:  1.Addition      2.Subtraction    3.Multiplication    4.Division    5.Exit
Enter your choice: 4
The resultant Division of Fractions is:1935/713

Menu:  1.Addition      2.Subtraction    3.Multiplication    4.Division    5.Exit
Enter your choice: 5
Exiting the calculator
Enter the denominator for multiplication table: 7

      1/7    2/7    3/7    4/7    5/7    6/7
1/7    1/49   2/49   3/49   4/49   5/49   6/49
2/7    2/49   4/49   6/49   8/49   10/49  12/49
3/7    3/49   6/49   9/49   12/49  15/49  18/49
4/7    4/49   8/49   12/49  16/49  20/49  24/49
5/7    5/49   10/49  15/49  20/49  25/49  30/49
6/7    6/49   12/49  18/49  24/49  30/49  36/49

psipl@psipl-OptiPlex-3000:~/Desktop/2023200128/EXP 2$ █

```

CONCLUSION:

In conclusion, Experiment No. 2 demonstrates encapsulation through the creation of Time and Employee classes. Additionally, a four-function calculator for fractions showcases versatile arithmetic operations with user-friendly input and output methods.